REMARKS

RESTRICTION

Applicants affirm election of group I, claims 1-12, for prosecution on the merits.

INDEFINITENESS AND INFORMALITIES IN THE SPECIFICATION

As indicated in the present specification, substituent D of formula I may be "covalently bound to the metal center M," when anionic, or if uncharged, "can be bound coordinatively to the metal center M" (p.6:9-13). To most accurately represent these alternate bonding situations, applicants have represented the substituents as -Z-D, defined D as including both monovalent and divalent groups, and have stated clearly in both the specification and the claims that D may be covalently bonded to the metal center M, in addition to being covalently bonded to substituent Z (see the description of n at the end of claim 2).

This method of describing and depicting this alternate bonding is well-known in the art, and one of ordinary skill would recognize the meaning and scope of coverage entailed therein. Applicants respectfully submit that claims 2-5 are not indefinite and that the specification is in a proper and accepted condition for prosecution on the merits.

REJECTION UNDER 35 USC §103(A)

The examiner rejects claims 1-12 under 35 USC §103(a) over Tani et al. (JP 10-

231317). Tani teaches ethylene polymerization in the presence of a catalyst composition containing a tridentate ligand/transition metal complex and a boron activator (Examples 2 and 7). The examiner asserts that Tani's further teaching of hydrocarboxy, hydrocarbylamino and hydrocarbylthio substituents suggests the presently claimed invention to one of skill in the art.

However, the presently claimed catalysts give unexpected results when compared with catalysts described by Tani. For instance, in examples 5 and 6 of Tani, polymerization using a 1,3,5-trimethyl-1,3,5-triazacyclohexane chromium catalyst (Catalyst D) resulted predominantly in, or at least in a high percentage of, oligomer fragments. Contrastingly, polymerization using the sterically similar 1,3-dimethyl-5-(2-oxidoethyl)-1,3,5-triazacyclohexane chromium compound (Catalyst of present example 8) resulted in polyethylenes having molecular weights over 35,000 g/mol and high melting points (present Examples 20 and 21). Tani does not suggest this effect that donor groups have surprisingly shown to lend to the polymerization process.

In addition, for those catalyst ligands where -Z-D is covalently bonded to the metal M, Tani makes no suggestion or teaching concerning this element of the present invention.

CONCLUSION

In view of the foregoing amendments and remarks, applicants consider that the rejections of record have been obviated and respectfully solicit passage of the

application to issue.

Please find attached a check for $110.00 for a one month extension of time.

Please charge any shortage in fees due in connection with the filing of this paper, including Extension of Time fees to Deposit Account No. 11-0345. Please credit any excess fees to such deposit account.

Respectfully submitted,
KEIL & WEINKAUF

David C. Liechty
Reg. No. 48,692

1350 Connecticut Ave., N.W.
Washington, D.C. 20036
(202)659-0100

DCL/kas

AMENDMENTS WITH MARKINGS TO SHOW CHANGES MADE

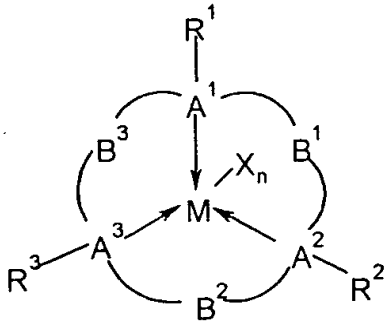
Please amend claims 1, 2, and 11 as follows:

1. (currently amended) A process for the polymerization of olefins, which comprises carrying out the polymerization in the presence of catalysts comprising the following components:

(A) at least one complex of a transition metal with a tridentate macrocyclic ligand which bears at least one substituent having a donor function and

(B) optionally ~~if desired~~, one or more activator compounds.

2. (currently amended) A process as claimed in claim 1, wherein the component (A) is a compound of the formula I

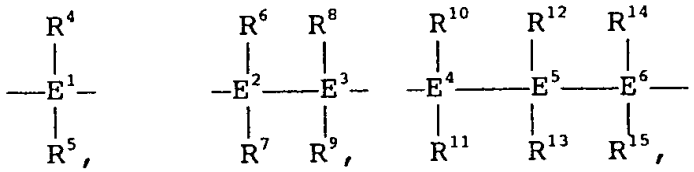


I

where the variables have the following meanings:

M is a transition metal of groups 3 to 12 of the Periodic Table,

B^1-B^3 are each a divalent radical selected from the group consisting of



where

E^1-E^6 are silicon or carbon and not more than two of E^4-E^6 are silicon,

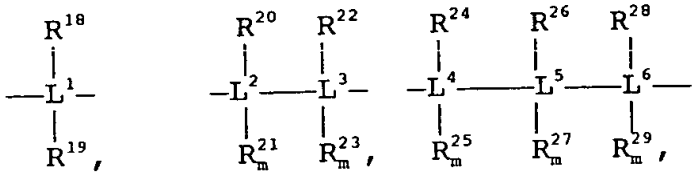
A^1-A^3 are nitrogen or phosphorus,

R^1-R^{15} are hydrogen, C_1-C_{20}-alkyl, 5- to 7-membered cycloalkyl which may in turn bear a C_6-C_{10}-aryl group as substituent, C_2-C_{20}-alkenyl, C_6-C_{20}-aryl, alkylaryl having from 1 to 10 carbon atoms in the alkyl part and 6-20 carbon atoms in the aryl part, SiR^{32}_3 or a radical of the formula -Z-D, where the organic radicals R^1-R^{15} may be substituted by halogen(s) and any two geminal or vicinal radicals R^1-R^{15} may also be joined to form a five- or six-membered ring, and at least one of the radicals R^1-R^{15} is a radical -Z-D,

where ~~D is a functional group having the following meanings:~~

D is $NR^{16}R^{17}$, NR^{16}, OR^{16}, O, SR^{16}, S, $PR^{16}R^{17}$, SO_3R^{16}, $OC(O)R^{16}$, CO_2, $C(O)R^{16}$, $C(NR^{16})R^{17}$, CN or a five- or six-membered heterocyclic ring system, where the radicals R^{16}-R^{17} may also be joined to Z to form a five- or six-membered ring;

Z is a divalent radical selected from the group consisting of:



where

L^1-L^6 are silicon or carbon, not more than two of L^4-L^6 are silicon and m=0 if any two of the vicinal radicals R^{20}, R^{22}, R^{24}, R^{26} and R^{28} form an aromatic ring or a double bond is formed between two adjacent L^2-L^6, and otherwise m=1,

X are, independently of one another, fluorine, chlorine, bromine, iodine, hydrogen, C_1-C_{10}-alkyl, C_2-C_{10}-alkenyl, C_6-C_{20}-aryl, alkylaryl having 1-10

carbon atoms in the alkyl part and 6-20 carbon atoms in the aryl part, $NR^{30}R^{31}$, OR^{30}, SR^{30}, SO_3R^{30}, $OC(O)R^{30}$, CN, SCN, =O, b-diketonate, BF_4-, PF_6- or bulky noncoordinating anions,

R^{16}-R^{31} are hydrogen, C_1-C_{20}-alkyl, 5- to 7-membered cycloalkyl which may in turn bear a C_6-C_{10}-aryl group as substituent, C_2-C_{20}-alkenyl, C_6-C_{20}-aryl, alkylaryl having from 1 to 10 carbon atoms in the alkyl part and 6-20 carbon atoms in the aryl part, SiR^{32}_3, where the organic radicals R^{16}-R^{31} may be substituted by halogen(s) and any two geminal or vicinal radicals R^{16}-R^{31} may also be joined to form a five- or six-membered ring,

R^{32} are, independently of one another, hydrogen, C_1-C_{20}-alkyl, 5- to 7-membered cycloalkyl which may in turn bear a C_6-C_{10}-aryl group as substituent, C_2-C_{20}-alkenyl, C_6-C_{20}-aryl, alkylaryl having from 1 to 10 carbon atoms in the alkyl part and 6-20 carbon atoms in the aryl part and any two geminal radicals R^{32} may also be joined to form a five- or six-membered ring,

n is a number from 1 to 4 which corresponds to the oxidation state of M or, if D is covalently bound to the metal center M, the oxidation state of M

minus the number of groups D covalently bound to M, and, furthermore, the value of n is reduced by 1 for each X=oxygen.

11. (currently amended) A process as claimed in claim 1, wherein at least one metal complex (A) in the presence of at least one catalyst (C) customary for the polymerization of olefins and, optionally ~~if desired~~, one or more activator compounds (B) is used.

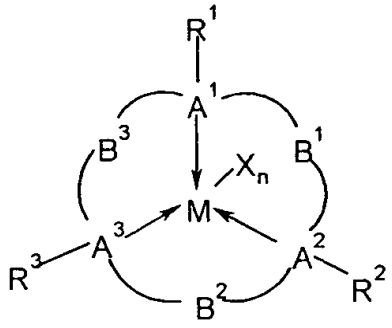
COPY OF ALL CLAIMS

1. (currently amended) A process for the polymerization of olefins, which comprises carrying out the polymerization in the presence of catalysts comprising the following components:

(A) at least one complex of a transition metal with a tridentate macrocyclic ligand which bears at least one substituent having a donor function and

(B) optionally, one or more activator compounds.

2. (currently amended) A process as claimed in claim 1, wherein the component (A) is a compound of the formula I

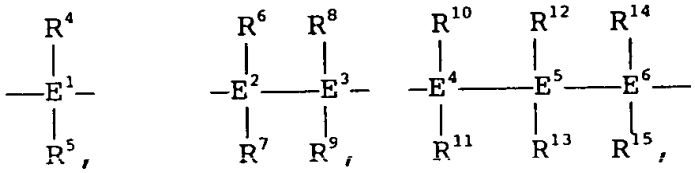


I

where the variables have the following meanings:

M is a transition metal of groups 3 to 12 of the Periodic Table,

B^1-B^3 are each a divalent radical selected from the group consisting of



where

E^1-E^6 are silicon or carbon and not more than two of E^4-E^6 are silicon,

A^1-A^3 are nitrogen or phosphorus,

R^1-R^{15} are hydrogen, C_1-C_{20}-alkyl, 5- to 7-membered cycloalkyl which may in turn bear a C_6-C_{10}-aryl group as substituent, C_2-C_{20}-alkenyl, C_6-C_{20}-aryl,

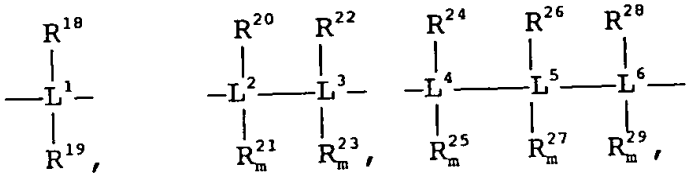
alkylaryl having from 1 to 10 carbon atoms in the alkyl part and 6-20 carbon atoms in the aryl part, SiR^{32}_3 or a radical of the formula -Z-D, where the organic radicals R^1-R^{15} may be substituted by halogen(s) and any two geminal or vicinal radicals R^1-R^{15} may also be joined to form a five- or six-membered ring, and at least one of the radicals R^1-R^{15} is a radical -Z-D,

where

D is $NR^{16}R^{17}$, NR^{16}, OR^{16}, O, SR^{16}, S, $PR^{16}R^{17}$, SO_3R^{16}, $OC(O)R^{16}$, CO_2, $C(O)R^{16}$, $C(NR^{16})R^{17}$, CN or a five- or six-membered heterocyclic ring system, where the radicals R^{16}-R^{17} may also be joined to Z to form a five- or six-membered ring;

B1 cont'd

Z is a divalent radical selected from the group consisting of:



where

L^1-L^6 are silicon or carbon, not more than two of L^4-L^6 are silicon and m=0 if any two of the vicinal radicals R^{20}, R^{22}, R^{24}, R^{26} and R^{28} form an aromatic ring or a double bond is formed between two adjacent L^2-L^6, and otherwise m=1,

X are, independently of one another, fluorine, chlorine, bromine, iodine, hydrogen, C_1-C_{10}-alkyl, C_2-C_{10}-alkenyl, C_6-C_{20}-aryl, alkylaryl having 1-10 carbon atoms in the alkyl part and 6-20 carbon atoms in the aryl part, $NR^{30}R^{31}$, OR^{30}, SR^{30}, SO_3R^{30}, $OC(O)R^{30}$, CN, SCN, =O, b-diketonate, BF_4-, PF_6- or bulky noncoordinating anions,

R^{16}-R^{31} are hydrogen, C_1-C_{20}-alkyl, 5- to 7-membered cycloalkyl which may in turn bear a C_6-C_{10}-aryl group as substituent, C_2-C_{20}-alkenyl, C_6-C_{20}-aryl, alkylaryl having from 1 to 10 carbon atoms in the alkyl part and 6-20 carbon atoms in the aryl part, SiR^{32}_3, where the organic radicals R^{16}-R^{31} may be substituted by halogen(s) and any two geminal or vicinal radicals R^{16}-R^{31} may also be joined to form a five- or six-membered ring,

R^{32} are, independently of one another, hydrogen, C_1-C_{20}-alkyl, 5- to 7-membered cycloalkyl which may in turn bear a C_6-C_{10}-aryl group as substituent, C_2-C_{20}-alkenyl, C_6-C_{20}-aryl, alkylaryl having from 1 to 10 carbon atoms in the alkyl part and 6-20 carbon atoms in the aryl part and any two geminal radicals R^{32} may also be joined to form a five- or six-membered ring,

n is a number from 1 to 4 which corresponds to the oxidation state of M or, if D is covalently bound to the metal center M, the oxidation state of M minus the number of groups D covalently bound to M, and, furthermore, the value of n is reduced by 1 for each X=oxygen.

3. (original) A process as claimed in claim 2, wherein only R^1 is a radical -Z-D.

4. (previously amended) A process as claimed in claim 2, wherein B^1, B^2 and B^3 are identical.

5. (previously amended) A process as claimed in claim 2, wherein D is oxygen, NR^{16}, $NR^{16}R^{17}$ or CN.

6. (previously amended) A process as claimed in claim 1, wherein the transition metal M comes from groups 3 to 8 of the Periodic Table.

7. (previously amended) A process as claimed in claim 1, wherein the transition metal M comes from group 6 of the Periodic Table.

8. (previously amended) A process as claimed in claim 1, wherein a compound selected from the group consisting of aluminoxane, dimethylanilinium tetrakispentafluorophenylborate, trityl tetrakispentafluorophenylborate and trispentafluorophenylborane is used as activator compound (B).

9. (previously amended) A process as claimed in claim 1, wherein at least one olefin selected from the group consisting of ethene, propene, 1-butene, 1-pentene, 1-hexene, 1-heptene or 1-octene is polymerized.

10. (previously amended) A process as claimed in claim 1, wherein the polymerization is carried out in suspension or in the gas phase.

11. (currently amended) A process as claimed in claim 1, wherein at least one metal complex (A) in the presence of at least one catalyst (C) customary for the polymerization of olefins and, optionally, one or more activator compounds (B) is

used.

12. (previously amended) A catalyst system comprising the following components:

B1 cont'd

a) at least one transition metal complex (A) as defined in claim 1 and

b) at least one activator compound (B).